



LEEDS
BECKETT
UNIVERSITY

Citation:

Snape, D and O'Hara, JP and Wainwright, B (2020) Reliability of blood biomarkers of physiological stress at rest and in response to exercise under hot humid conditions. In: Future Physiology, 06 July 2020 - 10 July 2020, Virtual Online. (Unpublished)

Link to Leeds Beckett Repository record:

<https://eprints.leedsbeckett.ac.uk/id/eprint/6820/>

Document Version:

Conference or Workshop Item (Accepted Version)

The aim of the Leeds Beckett Repository is to provide open access to our research, as required by funder policies and permitted by publishers and copyright law.

The Leeds Beckett repository holds a wide range of publications, each of which has been checked for copyright and the relevant embargo period has been applied by the Research Services team.

We operate on a standard take-down policy. If you are the author or publisher of an output and you would like it removed from the repository, please [contact us](#) and we will investigate on a case-by-case basis.

Each thesis in the repository has been cleared where necessary by the author for third party copyright. If you would like a thesis to be removed from the repository or believe there is an issue with copyright, please contact us on openaccess@leedsbeckett.ac.uk and we will investigate on a case-by-case basis.

Publishing Preview

0081

Reliability of blood biomarkers of physiological stress at rest and in response to exercise under hot-humid conditions.

Daniel Snape^{1,2}, Barney Wainwright¹, John O'Hara¹

¹Leeds Beckett University, Leeds, United Kingdom ²English Institute of Sport, Manchester, United Kingdom

Purpose: Establish the short-term reliability and acute responsiveness of biomarkers of physiological stress to exercise in the heat. As such, informing their prospective application in research and field settings. **Method:** Fourteen male endurance trained cyclists/triathletes completed two heat stress tests (HST), separated by 5-7 days. HST's involved 45-minutes fixed-intensity cycling ($2.5W \cdot kg^{-1}$) under hot-humid conditions ($32^{\circ}C$ and 70% relative humidity). Venous blood was drawn pre- and immediately post-HST for the concentration of normetanephrine (NMET), metanephrine (MET), kidney-injury molecule 1 (KIM-1), neutrophil gelatinase-associated lipocalin (NGAL), serum osmolality (S_{osmo}) and copeptin. **Results:** No biomarker displayed systematic trial order bias ($p \leq 0.05$). The majority of biomarkers had acceptable within-participant variation (CV range: 0.9-14.3%). Copeptin had the lowest short-term variation at rest (CV = 0.9%) and post-HST (CV = 1.2%). However, greater variation was evident in biomarkers MET and KIM-1 at rest (CV = 28.6 & 43.2%) and post-HST (CV = 29.9 & 29.6%), respectively. NMET exhibited *very large* increases (trial 1 = $\Delta 1048 \pm 461$; trial 2 = $\Delta 1067 \pm 408$) in response to exertional heat stress ($p < 0.0001$, $d = 2.8$; $p < 0.0001$, $d = 3.8$). In contrast, KIM-1 demonstrated *trivial* changes (trial 1 = $\Delta -3 \pm 21$; trial 2 = $\Delta 2 \pm 17$) in response to exercise in the heat ($p = 0.53$, $d = 0.1$; $p = 0.60$, $d = 0.1$). **Conclusion:** Each biomarker, except MET and KIM-1 had acceptable reliability at rest and following exercise. In addition, biomarkers NMET, copeptin and NGAL demonstrated large increases in response to exercise in the heat. Thus, these markers can provide accurate and sensitive measurement for wide-spread application in laboratory and field research.